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## Original article

Adolescent Reproductive Knowledge, Attitudes, and Beliefs  
and Future Fatherhood

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## A B S T R A C T

**Purpose:** With a growing focus on the importance of men's reproductive health, including pre-conception health, the ways in which young men's knowledge, attitudes, and beliefs (KAB) predict their reproductive paths are understudied. To determine if reproductive KAB predicts fatherhood status, timing and residency (living with child or not).

**Methods:** Reproductive KAB and fatherhood outcomes were analyzed from the National Longitudinal Study of Adolescent Health, a 20-year, nationally representative study of individuals from adolescence into adulthood. Four measures of reproductive KAB were assessed during adolescence in waves I and II. A generalized linear latent and mixed model predicted future fatherhood status (nonfather, resident/nonresident father, adolescent father) and timing while controlling for other socio-demographic variables.

**Results:** Of the 10,253 men, 3,425 were fathers (686 nonresident/2,739 resident) by wave IV. Higher risky sexual behavior scores significantly increased the odds of becoming nonresident father (odds ratio [OR], 1.30;  $p < .0001$ ), resident father (OR, 1.07;  $p = .007$ ), and adolescent father (OR, 1.71;  $p < .0001$ ); higher pregnancy attitudes scores significantly increased the odds of becoming a nonresident father (OR, 1.20;  $p < .0001$ ) and resident father (OR, 1.11;  $p < .0001$ ); higher birth control self-efficacy scores significantly decreased the odds of becoming a nonresident father (OR, .72;  $p < .0001$ ) and adolescent father (OR, .56;  $p = .01$ ).

**Conclusions:** Young men's KAB in adolescence predicts their future fatherhood and residency status. Strategies that address adolescent males' reproductive KAB are needed in the prevention of unintended reproductive consequences such as early and nonresident fatherhood.

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IMPLICATIONS AND  
CONTRIBUTION

Young men's reproductive knowledge, attitudes, and beliefs during adolescence predict their future fatherhood status, timing, and residency. Earlier public health and educational interventions to identify at-risk young men may optimize fatherhood outcomes.

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The field of reproductive health is turning attention toward understanding young men's reproductive needs and outcomes [1]. Despite the growing recognition of the importance of young men in reproductive health programs and policies [2,3], knowledge is lacking regarding men's reproductive health [4] including such factors as fatherhood status and timing. Although many studies explore women's knowledge, attitudes, and beliefs (KAB) and their reproductive outcomes [5–7], little is known about such associations in men. Recent research has examined adolescent male's reproductive KAB and their sexual behavior, including abstinence, and condom and contraception use [8–10]; however, because of data limitations, these studies could not account for a central outcome, entrance into fatherhood. Measuring KAB during adolescence, a period when such knowledge about sexual and reproductive behavior is developed [11], has the potential to inform future outcomes such as fatherhood status, timing, and residency.

Studying adolescent reproductive KAB and later fatherhood may lead to earlier identification of young men at risk for becoming adolescent or nonresident fathers and improve sexual education programs to address the needs of these young men thereby helping them take control of their reproductive outcomes. Adolescent and nonresident fathers are known to be younger, have less education, lower socioeconomic status, and to be unemployed [12,13] with nonresident fathers having less contact, involvement, and quality interactions with their children than resident fathers [14–16]. Although many unmarried couples are cohabitating at the time of the child's birth, 63% of unmarried fathers are nonresident with their child after 5 years [14]. One compelling perspective for understanding young, nonresident fathers and their well-being suggests including reproductive cultural values and norms along with reproductive attitudes, aspirations, and resources as part of a conceptual framework of fatherhood [17]. The National Campaign to End Teenage and Unwanted Pregnancy lists 17 characteristics of effective sexual education programs; paramount among them is to address “sexual psychosocial risk and protective factors that affect sexual behavior (e.g., knowledge, perceived risks, values, attitudes, perceived norms, and self-efficacy) and change them” [18]. Thus, education programs that focus on KAB during the formative adolescent years may be particularly useful in preventing future unintended transitions to fatherhood.

The primary goal of this study was to determine if certain adolescent reproductive KAB predict fatherhood status, timing, and residency. Data come from the National Longitudinal Study of Adolescent Health (Add Health), which followed a nationally representative sample of American youth from adolescence through early adulthood. This large, longitudinal, and nationally representative data set allows better understanding of the reproductive paths young men take, fostering associations between adolescent KAB and later fatherhood outcomes. Understanding these connections may help identify at-risk young men earlier, allowing preventive interventions that address these men's reproductive KAB.

## Methods

### Study design and sample

The National Longitudinal Study of Adolescent Health (Add Health) is a longitudinal study of a nationally representative sample of youth focusing on social, behavioral, and biomedical health as

they progress from adolescence into adulthood. Wave I ( $n = 10,253$  men, ages = 12–21 years; response rate (RR), 79%) was conducted in 1994–1995; wave II ( $n = 7192$ , ages = 13–21 years; RR, 88.6%) in 1996; wave III ( $n = 7192$ , ages = 18–28 years; RR, 77.4%) 6 years later in 2001–2002; and wave IV ( $n = 7347$ , ages = 25–34 years; RR, 80.3%) in 2007–2008. Procedures for data access and analysis were implemented per our institutional review board and in agreement with the Add Health data security plan.

### Variables

**Fatherhood status.** Fatherhood status was the outcome of interest in this study. It was coded into three categories: nonfathers (referent), nonresident fathers, and resident fathers. At each wave, men reported in the *household roster* whether they had a biological child living with them; beginning in wave III, men reported in the *live child data set* whether they fathered a biological child at all. If the same child is listed in the live child data set and the household roster, the father was categorized as a resident father. If a child was listed only in the live child data set, the father was categorized as a nonresident father. If no child was listed in either, the man was categorized as a nonfather. If a biological child was listed only in the household roster (as may have occurred before wave III), then the father was categorized as a resident father. Resident and nonresident fatherhood status was established at the earliest wave a biological child was listed and held constant through all future waves.

**Reproductive knowledge, attitudes, and beliefs.** Reproductive KAB was measured using four scales from data in both waves I and II. Add Health contained no intact surveys or scales from preexisting literature, building instead on a number of successful past surveys of adolescents and adults [19]. Three of the four measures used—(1) risky sexual behavior (RSB) scales; (2) pregnancy attitudes (PA); and (3) birth control self-efficacy (BCSE)—were administered in the student's home by an interviewer. The fourth measure, (4) birth control attitudes, was administered via audio-Computer Assisted Self-Interview (CASI) technology because of sensitivity. Each item was answered on a five-point scale from “strongly agree” to “strongly disagree” except where otherwise noted. The KAB scales from both waves I and II were used as individual variables in all analyses.

The RSB scale is a 10-item scale assessing reasons for engaging in or not engaging in sexual intercourse. This scale has been used in numerous studies investigating sexual and contraceptive behaviors, unintended pregnancies, and sexually transmitted infections [20–23]. Participants were presented with statements such as “If you had sexual intercourse your friends would respect you more” and “If you had sexual intercourse, you would feel less lonely.” Higher scores indicated a greater motivation to engage in RSB.

The PA scale is a two-item scale assessing the perceived impact of a pregnancy on the respondent's life [6,24]. Participants were presented with the statements “Getting someone pregnant at this time in your life is one of the worst things that could happen to you” and “It would not be all that bad if you got someone pregnant at this time in your life.” Higher scores indicate a more positive attitude toward getting someone pregnant.

The BCSE scale is a three-item scale assessing the perceived ability to ensure the use of birth control during sexual intercourse, used previously in studies of adolescent contraceptive usage [23–25]. Each item was answered on a six-point scale from

“very sure” to “very unsure”, with the additional option of “I never want to use birth control”. Higher scores indicated a greater sense of self-efficacy to use birth control.

The birth control attitudes (BCA) scale is a seven-item scale assessing reasons for using or not using birth control [23]. Participants were presented with statements such as “In general, birth control is too much of a hassle to use” and “Using birth control interferes with sexual enjoyment.” Higher scores indicated a greater motivation to use birth control.

All four KAB scales were standardized to a continuous, standard normal distribution for both waves I and II.

**Sociodemographic variables.** Sociodemographic variables were included in the analyses to control for confounding effects. Mother’s education, family income, and participant’s self-reported race measured at wave I were included in the analyses. Participant’s education, personal income (if family income not used), age, and general health (an ordinal self-reported measure assessing health on a scale from “poor” to “excellent”) measured at waves I through IV were included in the analyses. Age and marital status were removed from the analysis of adolescent fatherhood status because of their both being perfectly predictive of the outcome.

#### Statistical analysis

To diagnose measures of validity, reliability, and unidimensionality (i.e., whether the scales measured a single construct) of the four latent constructs for both waves, classical item analyses were run including Cronbach  $\alpha$  to measure internal consistency, item–rest correlations to measure homogeneity, and the ratio of the first two eigenvalues to assess dimensionality.

A logistic regressions was used to predict the odds of becoming an adolescent father given the KAB scales and key demographic variables (excepting age and marital status). A multinomial logistic regression was then used to predict the odds of becoming either a nonresident or resident father (compared to a nonfather) given the aforementioned scales and independent variables. These regressions were modeled using a generalized linear latent and mixed model, resulting in four repeated measures for each participant and allowing each wave to act as a level 1 cluster [26]. Sample participants were classified within the generalized linear latent and mixed model into one of three fatherhood categories: nonfathers (referent), nonresident fathers, and resident fathers. When modeling the odds of becoming an adolescent father, the participants were classified into one of two categories: adolescent father (aged <18 years) and adult father (aged  $\geq$ 18 years; referent). To account for certain ethnicities being oversampled in Add Health (e.g., blacks from higher educated families, Chinese, Cuban, and Puerto Rican participants), Add Health longitudinal weights were used in all analyses. Furthermore, to account for this oversampling, a level 2 random intercept was determined for race. All analyses were conducted in Stata 12.1 with multiple imputations of five cycles calculated to account for missing data [27].

## Results

#### Sample demographics

Of the 10,253 men in the sample, 3,425 (33.5%) were fathers and 6,828 (66.5%) were nonfathers by wave 4. Of the fathers,

686 (20.0%) were nonresident and 2,739 (80.0%) were resident (Table 1). Most resident fathers were married (72%), compared with nonresident fathers (8%) and nonfathers (13%). Equal numbers of nonresident fathers were white and African-American. Resident fathers and nonfathers had more education than nonresident fathers. Additional demographic characteristics can be found in Table 1.

#### Knowledge, attitudes, and beliefs scale diagnostics

Supplementary Table A1 provides descriptive statistics of each KAB scale at waves I and II. Psychometric properties were assessed by the totality of the information at both waves. By wave II, all the scales had a coefficient  $\alpha$  of at least .70 with the two shortest scales each being slightly under .7 in wave I. The item–rest correlations for all items were  $>.2$  and the mean item–rest correlations for each scale were  $>.4$  at each wave [28]. The eigenvalue ratio, which determines whether the cumulative variance of the items in a scale can be explained by a single factor, exceeded the recommended value of 4.0 for all scales except the two-item Perceived PA scale.

#### Fatherhood status and adolescent knowledge, attitudes, and beliefs

Three of the four adolescent reproductive KAB scales collected during adolescence predicted future fatherhood status controlling for key sociodemographic variables for all the analyses: RSB, PA, and BCSE (Table 2 and Table 3). The birth control attitudes scale was not statistically significant for either analysis.

Table 2 provides results of the logistic regression comparing the odds of becoming an adolescent father compared to an adult father. RSBs were positively associated with the odds of becoming an adolescent father compared to an adult father with an increase in the odds ratio (OR) by 71% (OR, 1.71;  $p < .0001$ ) for every one SD increase in RSB score. A single SD increase in the BCSE score was associated with a 44% decrease in the OR of becoming an adolescent father (OR, .56;  $p = .01$ ).

Table 3 provides results of the multinomial logistic regression comparing the odds of becoming either a nonresident father or a resident father compared to a nonfather. A one SD higher RSB score increased the OR of becoming a nonresident father by 30% (OR, 1.30;  $p < .0001$ ) and increased the OR of becoming a resident father by 7% (OR, 1.07;  $p = .007$ ). A single SD higher PA score was related to an increase of 20% in the OR of becoming a nonresident father (OR, 1.20;  $p < .0001$ ) and an 11% increase in the OR of becoming a resident father (OR, 1.11;  $p < .0001$ ). A one-unit SD higher BCSE score was related to a decrease in the OR of becoming a nonresident father by 28% (OR, .72;  $p < .0001$ ), as might be expected, but it was not statistically significantly related with the odds of becoming a resident father (OR, .93;  $p = .75$ ). The birth control attitudes scale was not statistically significant in predicting the odds of becoming either a nonresident father or resident father. Figure 1 provides bar plots of the estimates of becoming an adolescent father (comparison is to adult father), of becoming a nonresident father, and of becoming a resident father (comparison is to nonfathers).

Tables 2 and 3 also list the ORs of fatherhood status for the control variables. Mother’s education and own education decreased the odds of becoming an adolescent father (Table 2). When estimating the odds of becoming either a nonresident or a resident father compared to a nonfather, income level,

**Table 1**  
Characteristics of fathers and nonfathers

	Nonfathers (N = 6,828)	Nonresident fathers (N = 686)	Resident fathers (N = 2,739)	p value <sup>a</sup>
Age at fatherhood entrance <sup>b</sup>	NA	21.91 (3.98)	25.60 (3.91)	.355
Race <sup>c</sup>				<.001
White	3,434 (50.6)	274 (39.3)	1,460 (53.3)	
African-American	1,331 (19.6)	274 (39.3)	520 (19.0)	
Hispanic	1,115 (16.4)	97 (14.1)	502 (18.3)	
Asian	609 (9.0)	15 (2.2)	143 (5.2)	
Other	302 (4.5)	26 (3.8)	113 (4.1)	
Own education <sup>c</sup>				<.001
Less than high school (HS)	439 (6.4)	127 (18.5)	291 (10.6)	
HS graduate, vocational school, or technical school	1,357 (19.9)	244 (35.6)	927 (33.8)	
Some college to college graduate	2,734 (40.0)	251 (36.6)	1,227 (44.8)	
Some graduate school to professional degree	588 (8.6)	15 (2.2)	140 (5.1)	
Personal income (wave IV) <sup>c</sup>				<.001
<\$30,000	698 (18.5)	137 (36.3)	294 (15.8)	
\$30,000–\$49,999	833 (22.1)	86 (22.8)	438 (23.6)	
\$50,000–\$74,999	852 (22.6)	79 (20.9)	503 (27.1)	
>\$75,000	1,391 (36.9)	75 (19.9)	621 (33.5)	
General health <sup>b</sup>	3.09 (.848)	3.04 (.871)	3.11 (.824)	.236
Marital status <sup>c</sup>				<.001
Married	857 (12.6)	54 (7.9)	1,975 (72.1)	
Unmarried	5,971 (87.4)	632 (92.1)	764 (27.9)	
Mother's education <sup>c</sup>				<.001
Less than HS	868 (16.2)	115 (20.6)	419 (19.2)	
HS graduate, vocational school, or technical school	2,017 (37.7)	256 (45.9)	967 (44.2)	
Some college to college graduate	1,919 (35.9)	162 (29.0)	674 (30.8)	
Some graduate school to professional degree	545 (10.2)	25 (4.5)	127 (5.8)	
Parent's income (wave I) <sup>c</sup>				<.001
<\$30,000	1,696 (29.7)	262 (38.9)	784 (29.2)	
\$30,000–\$49,999	1,355 (23.7)	137 (20.4)	596 (22.2)	
\$50,000–\$74,999	1,214 (21.3)	84 (12.5)	447 (16.6)	
>\$75,000	1,442 (25.3)	189 (28.1)	862 (32.1)	

<sup>a</sup> p values derived from the F-test (continuous) and chi-square test (categorical variables).

<sup>b</sup> Mean (standard deviation).

<sup>c</sup> N (%).

employment status, marital status, and age were all positively related to the odds of becoming a resident father. However, only age was statistically significant among these variables when predicting the odds of becoming a nonresident father. Higher mother's education decreased the odds of becoming a resident father, but a higher personal education decreased the odds of becoming a nonresident father.

**Table 2**  
Logistic regression model predicting adolescent fatherhood status

	Adolescent fatherhood status <sup>b</sup> (N = 362)		
	Odds ratio (standard error)	p value	95% Confidence interval
Risky sexual behaviors <sup>a</sup>	1.71 (.18)	<.0001	1.39–2.12
Pregnancy attitudes <sup>a</sup>	1.25 (.22)	.205	.89–1.76
Birth control self-efficacy <sup>a</sup>	.56 (.13)	.010	.36–.87
Birth control attitudes <sup>a</sup>	1.04 (.14)	.752	.80–1.35
Mother's education	.82 (.08)	.046	.68–1.00
Own education	.62 (.04)	<.0001	.54–.71
Income	.97 (.14)	.834	.73–1.29
Employed	.91 (.12)	.473	.70–1.18
General health	.96 (.05)	.360	.87–1.05
Intercept	.02 (.01)	<.0001	.01–.03
Random effects	Estimate		Standard error
Race			
var (γ)	.223		.0241

<sup>a</sup> Knowledge, attitudes, and belief scores were standardized over all men in the study.

<sup>b</sup> Adult fathers (aged ≥18 years) were referent group.

## Discussion

In this study of associations between reproductive KAB and future fatherhood outcomes in a nationally representative sample, we find that several attitudes and beliefs identified during adolescence can predict both fatherhood and residency status in our sample of young adults up to age 34 years, after controlling for key variables such as age, income, race, maternal education, health, employment, and marriage. Young men scoring higher on a RSB scale during adolescence were more likely to become fathers of any type with a greater increase in odds for nonresident than resident father status and adolescent father status (<18 years) compared to adult father status. Similarly, men who had more positive attitudes toward pregnancy during adolescence were more likely to be fathers, with a greater increase in odds for nonresident father status. Greater BCSE predicted lower odds of becoming a father overall but, if a father, more likely to be a resident father and more likely to be an adult father.

Adolescence is a key developmental period for reproductive KAB, and many health KAB and behaviors established during adolescence persist into adulthood. Although past studies have identified how adolescent reproductive KAB affects initiation of sexual intercourse, contraceptive use, and pregnancy during adolescence [5–8,10,20,23,24], these studies were unable to address how these KAB formed during adolescence impact pregnancy outcomes later in life for men. As many of these prior studies focus exclusively on women [5–7], it is particularly important to investigate this relationship for men to better

**Table 3**

Multinomial logistic regression model predicting fatherhood and residence status

	Fatherhood and residence status					
	Nonresident father <sup>b</sup> (N = 686)			Resident father <sup>b</sup> (N = 2,739)		
	OR (SE)	p value	95% CI	OR (SE)	p value	95% CI
Risky sexual behaviors <sup>a</sup>	1.30 (.06)	<.0001	1.18–1.43	1.07 (.03)	.007	1.02–1.12
Pregnancy attitudes <sup>a</sup>	1.20 (.05)	<.0001	1.10–1.30	1.11 (.03)	<.0001	1.06–1.17
Birth control self-efficacy <sup>a</sup>	.72 (.05)	<.0001	.63–.81	.93 (.04)	.075	.86–1.01
Birth control attitudes <sup>a</sup>	1.10 (.06)	.061	1.00–1.22	1.00 (.04)	.904	.94–1.08
Mother's education	.89 (.10)	.281	.72–1.10	.79 (.01)	<.0001	.77–.82
Own education	.66 (.02)	<.0001	.61–.70	.88 (.06)	.069	.77–1.01
Income level	1.05 (.08)	.523	.90–1.22	1.16 (.06)	.003	1.05–1.29
Employed	1.09 (.07)	.212	.95–1.24	1.30 (.04)	<.0001	1.22–1.39
Married	5.18 (4.50)	.058	.94–28.41	5.65 (1.49)	<.0001	3.37–9.48
Age	1.09 (.03)	.001	1.03–1.14	1.18 (.02)	<.0001	1.15–1.22
General health	.99 (.05)	.905	.90–1.10	1.02 (.02)	.337	.98–1.06
Intercept	.05 (.02)	<.0001	.03–.09	.03 (.01)	<.0001	.02–.05
Random effects	Estimate			SE		
Race						
var ( $\gamma$ )	.028			.0068		

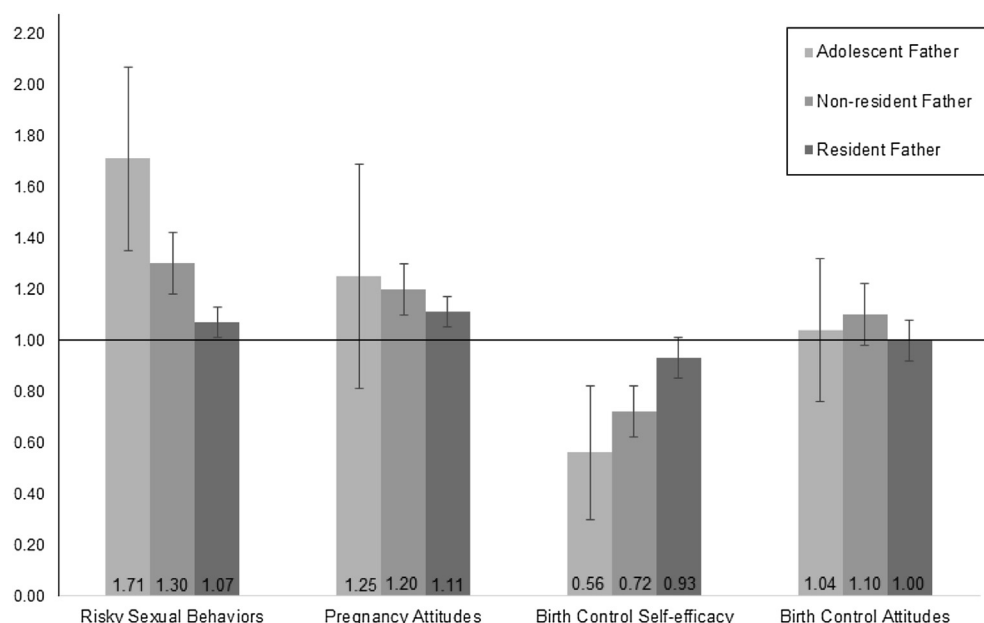
CI = confidence interval; OR = odds ratio; SE = standard error.

<sup>a</sup> Knowledge, attitude, and belief scores were standardized over all men in the study.<sup>b</sup> Nonfathers were referent group.

understand the paths leading to various fatherhood states. This study establishes that many of the KAB that are associated with adolescents' sexual and contraceptive behavior during adolescence continue to be associated with their reproductive outcomes into young adulthood.

Examining certain KAB responses more closely, endorsement of RSB and PA had the strongest associations with becoming a father, and among fathers, a greater odds of being a nonresident father, whereas greater BCSE decreased the odds of becoming a father at all, or if a father, it significantly decreased the odds of being a nonresident father. The first two associations are likely

due to the fact that RSB and ambivalent attitudes toward pregnancy may contribute to a higher risk of unplanned pregnancy. In turn, unplanned pregnancy puts men at higher risk for nonresident fatherhood, with its potential detrimental effects on father involvement, child academic performance, and child behavioral development [29,30]. A similar explanation may be applicable to BCSE, which was only statistically significant among nonresident fathers. Lower BCSE may lead to greater unprotected sex, which is likely to result in an unplanned pregnancy and a nonresident father. Therefore, for men who become resident fathers, it may be that the pregnancy is more likely to be planned, and thus, men



**Figure 1.** Predicted odds ratios of becoming an adolescent father, nonresident father, or resident father based on knowledge, attitudes, and beliefs measured in early adolescence.



who have the self-efficacy and confidence [10] to avoid unprotected sex may be choosing to become fathers with more intention. The lack of significance around the birth control attitudes score may reflect the deficit in knowledge among adolescents from certain regions in the United States regarding birth control and the reproductive system in general [23,31]. Although BCSE presupposes a confidence about the knowledge of using birth control successfully, attitudes toward birth control do not. Thus, birth control attitudes may not be as useful an instrument for predicting fatherhood outcomes as self-efficacy.

The ability to identify young men during adolescence who have reproductive KAB that are predictive of nonoptimal fatherhood paths has the potential to pave the way for more effective interventions. If those most at risk can be identified during adolescence, before they have entered fatherhood, educational programming and support can be provided that may change their reproductive trajectories, as has been shown in adolescent women [32,33]. Programming and interventions for adolescent male reproductive health is an understudied and underdeveloped area, and therefore, the ideal form of such support is not evident.

As young men are historically the least likely to be engaged in the health care system, the first challenge may be finding and connecting with young males. One possibility is school-based teen clinics, which have successfully provided interventions for adolescent females, although no such positive results have been found thus far for adolescent men [34]. Clinics outside a school setting specifically designed to target young men, such as the Young Men's Clinic at New York-Presbyterian [35], may also serve as a base from which to provide interventions. Community-based programming has proven effective in addressing HIV risk reduction [36] and may be a useful approach for addressing men's reproductive KAB.

Developmentally appropriate programs designed to engage young men as they are forming their reproductive KAB are essential [18,37,38]. One promising approach is preconception health care for men [37,39]. Education surrounding reproductive KAB can be part of such care and begin as early as adolescence. Although ideally these young men will not be entering fatherhood until later in the life course, providing support during adolescence, especially to men at risk for entering fatherhood early or becoming nonresident fathers, may have a positive effect if and when these men do become fathers. Intervening early, especially before the entrance into fatherhood, can help identify risks to young men's physical and mental health, resulting in a potentially healthier male, partner and father [31].

Our study has limitations. First, although Add Health is a longitudinal study, the reproductive KAB survey was only administered at waves I and II, and therefore, changes in participants later KAB are unknown. Additionally, as a longitudinal study with four data collection time points, our data cannot begin to pinpoint the exact relationship between KAB, sexual behaviors, and timing of fatherhood. However, identifying associations between adolescent KAB endorsement and time to fatherhood is contingent on first identifying associations between the two as we have shown. Second, fatherhood residency is constrained to one entry per participant, so we cannot account for changes some fathers may have had between nonresident and resident fatherhood. Finally, because of study design and timing, our sample consists of younger fathers. However, resident fathers' age of fatherhood entry, 25, is the same as the National Survey of Family Growth's age at the first birth for men.

In conclusion, growing attention is being paid to the importance of including young men in sexual and reproductive health research across the life course and how KAB in adolescence lays a foundation for future outcomes. In this longitudinal, nationally representative sample of young men followed from adolescences through young adulthood, we found that their adolescent reproductive KAB predicts future fatherhood and residency status. Knowing which young men may be at risk for early or nonresident fatherhood allows for innovative educational programs and public health interventions that focus on prevention for young men in adolescence.

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## Supplementary Data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jadohealth.2015.12.010>.

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